Seamless Mode Switching for Shared Control of Semiautonomous Vehicles, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

Whether it be a crew station, the Shuttle Remote Manipulator System (SRMS), an unmanned ground rover (UGV) or air vehicle (UAV), or teams thereof, the controllers for such systems will be complex, multilevel, usually distributed, systems. When a human user desires to switch between automatic and manual control, the transition must occur at all levels of the controller. There exist no well-developed strategies for managing such transitions and no proven methods for guaranteeing overall stability in the classical control-theoretic sense, or even safety and reliability in the general sense. These type of issues will span virtually every shared-control application in future NASA exploration systems. Intelligent Automation, Inc. proposes to use a two-level, distributed robot controller with multimodal user interface (UI) and demonstrate a technique to seamlessly transition between teleoperation and autonomous operation. The technique is based on using Hidden Markov Models to identify the current active state at each level of the controller. The demonstration platform was developed for a previous NASA project for JSC to develop automatic programming methods for astronaut assistants.

Primary U.S. Work Locations and Key Partners
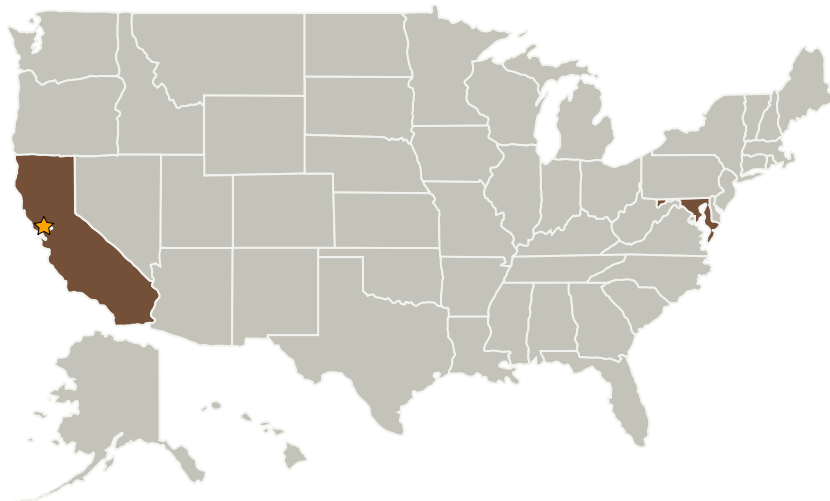
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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Printed on 11/30/2022
04:41 PM UTC

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Organizations Performing Work	Role	Type	Location
⭐Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Intelligent Automation, Inc.	Supporting Organization	Industry	Rockville, Maryland

Primary U.S. Work Locations	
California	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Donald G Myers

Technology Areas

Primary:

- TX10 Autonomous Systems
  └ TX10.4 Engineering and Integrity
    └ TX10.4.1 Verification and Validation of Autonomous Systems